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PRELIMINARY RESULTS OF INVESTIGATION OF MAGNETIC
STORMS FOR THE FIRST HALF OF IGY

For the period of 9 months of IGY VI 1957-III 1958 nine very great and great magnetic storms took place. For the period of all 1957 13 very great and great storms took place - that year was year of maximum magnetic activity of current cycle. During the previous cycle the biggest number of very great and great storms (II) took place in 1947.

There is an opinion in literature that one of the main characteristics of magnetic storms, which is connected with physical properties of corpuscular streams calling forth magnetic storms is a type of a storm commencement (sudden or gradual). It is assumed that the type of commencement depends on velocity of corpusculs (Mustel E.R.). It is considered that the type of commencement is due to the conditions of the contact of the Earth with the stream (with the front or the lateral part of the stream; Bartels J.) etc.

The author considers that the type of a storm commencement is not one of the main physical characteristics of a storm. In favour of this opinion we have:

1) Relative quantity of storms with sudden commencement does not depend on the phase in a cycle of activity in a simple way,

2) One can observe the storms with sudden and gradual commencement of any strength,

3) The type of a storm commencement does not depend on duration of a period of time, passed between the moment of a storm commencement and the moment of geoeffective region intersection through the central meridian.

Moreover the revision of magnetograms makes one sure that the most storms and disturbances of any intensity have sudden commencements or impulses and thus the storms with sudden commencement do not form a special class.

The character of the irregular part of the field of storms depends to a great extent on heliographic coordinates of the sources. The passing of flocculs, as E.R.Mustel found out,

- 2 -

through the Earth's projection on the Sun, causes magnetic disturbances. In the author's opinion magnetic disturbances are observed not only when flocculi pass through the Earth's projection on the Sun, but also when flocculi together with spots pass through it. The greatest storms are caused by the passing of the regions with spots. Moreover, as the author found out, the storms and disturbances, connected with the passing of geoactive regions through the Earth's projection on the Sun, are characterized by the existence of shortperiodical part of spectrum D_1 . The other class of storms and disturbances, in the author's opinion, consists of the storms which are associated with solar regions far from the Earth's projection on the Sun (with heliolatitudes of 20° - 40°). The storms and disturbances of this class are characterized by the absence or weakness (in middle and low latitudes of the Earth) of the shortperiodical part of the spectrum D_1 , mentioned above. The main character of oscillations in the storms and disturbances of this class is more smooth. These two classes of storms depending on the character of D_1 and on the attitude of the conditions to the intersection of geoactive regions through the Earth's projection on the Sun, are associated with different conditions of interaction of geomagnetic field with corpuscular streams.

The intensity of a storm depends on the intensity of the active process on the Sun. Very great magnetic storms in the years of high magnetic activity are caused by remoted, from the Earth's projection on the Sun, very active regions on the Sun.

The greatest storms of the first nine months of the IGY (september 1957) are associated with spots and flocculi in the latitudes 10° - 25° and have 3-2 day lag from the moments of geoactive regions intersection through the central meridian on the sun.

It is observed that the solar regions, which do not intersect the Earth's projection on the Sun, often create storms without storm-time variations (without Dst) of the type of bays in middle latitudes.

- 3 -

Geoeffectivness of the Sun regions is greates when there are no twin regions in the opposite hemisphere of the Sun.

The consideration of the data on the storms and solar phenomena for the years from 1949 to 1957 showed that corpuscul geoeffective radiation travells the path from the Sun to the Earth in the most cases for 3-4 days in the years high activity, for 5-4 days in the years of the falling activity and for 12 days in the years of the minimum. There are few cases when this path was travelled for 24 hours. If we consider 23 cases of storms and disturbances for first six mounths of the ICY we see that in 5 cases this interval was equal to 5 days, in 8 cases- 4 days, in 10 cases - 3 days.

The observed regularities in the character of a storm may be explained by the dependence on the conditions of the traveling of corpuscul stream near the Earth. "Far" from the Earth's proection slightly-active regions create the streams going in main near the Earth without forming ring- strom near the Earth- the region crossing the Earth's proection on the Sun create the streams enclosing the Earth. The value of minimal distance from axial line of stream to the Earth must be considered the characteristic parametere for storms.

Intensive active periods of storms with great velocities of variations correspond to the periods when the Earth is in the streams emitted from the active regions of the Sun, where are spots.

The september storms of 1957 serve as an example to this.